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LATERAL LINE OF *DIPLOSPINUS MULTISTRIATUS* (TELEOSTEI: GEMPYLIDAE)

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Abstract.—The existence of the lateral line in *Diplospinus multistriatus* has been questioned. The lateral line of *D. multistriatus* is described here and compared with that of closely related *Paradiplospinus gracilis*. Most of the (upper) lateral line of both species runs nearer the ventral contour of the body than the dorsal contour. This type of lateral-line conformation is found in some trichiurid genera, but not in other gempylid genera. Lateral-line scales of both species are tube-shaped with an irregular longitudinal slit. This type of lateral-line scale is not found in any other genera of Gempylidae or Trichiuridae.

Since *Diplospinus multistriatus* was described by Maul (1948) from Madeira, considerable numbers of specimens have been collected widely in tropical and temperate waters of the Atlantic, Pacific and Indian oceans (Parin and Bekker 1972:161, Fig. 17). Maul (1948) studied the holotype with six paratypes and wrote, "the skin is smooth and there is no trace of a lateral line." Later, Tucker (1956) examined one of the paratypes and reported, "there are traces of an apparent and highly probable lateral line," but he did not mention this further. No other authors have paid special attention to the lateral line of *D. multistriatus*.

While examining specimens of *D. multistriatus* at the National Museum of Natural History (USNM), Smithsonian Institution, traces of a lateral line were recognized. As there are no undamaged specimens of either *D. multistriatus* or *Paradiplospinus gracilis,* these observations are based on many specimens compounded to reconstruct the lateral line.

Material examined.—Diplospinus multistriatus Maul: USNM 215428, 2 specimens (16.5, 55.2 mm SL), 21°30′N, 158°30′W, 19 Jan. 1970; USNM 215449, 6 (42.1–188.4), 21°30′N, 158°30′W, 23 Sep. 1970; USNM 100492, 1 (48.0), 29°00′N, 76°23′W, 28 Feb. 1914; USNM 226993, 3 (98.2–162.6), 27°45′N, 91°18.5′W, 23 Feb. 1964; USNM 215397–8, 3 (134.7–203.0), 21°30′N, 158°30′W, 28 Feb. 1971; USNM 215395, 1 (141.0), 21°30′N, 158°30′W, 17 Sep. 1970; USNM 215433, 2 (142.5, 152.4), 21°30′N, 158°30′W, 16 Sep. 1970; USNM 194458, 1 (175.1), 29°40′N, 69°05′W, 29 Mar. 1957; USNM 219967, 2 (175.6, 213.3), 33°04′N, 39°29′W, 27 Apr. 1979; USNM 215391, 1 (188.4), 21°30′N, 158°30′W, 15 Sep. 1970; USNM 215394, 1 (203.8), 21°30′N, 158°30′W, 14 Dec. 1970; USNM 215454, 1 (232.8), 21°30′N, 158°30′W, 18 Sep. 1971.

Paradiplospinus gracilis (Brauer): USNM 208104, 1 specimen (47.7 mm SL), 49°06′S, 120°15′W, 19 Dec. 1965; USNM 208446, 9 (141.0–335.0), 40°18′S, 39°04′W, 8 Mar. 1971; USNM 208448, 6 (161.7–320.0), 39°47′S, 43°38′W, 7 Mar. 1971; USNM 208449, 9 (182.0–349.0), 38°20′S, 54°33′W, 5 Mar. 1971; USNM 226992, 1 (355.0), 40°08′S, 82°47′W, 2 Oct. 1966.

Identification

Diplospinus multistriatus and *Paradiplospinus gracilis* are similar in external appearance. Specimens obtained by usual collecting methods are almost always

Table 1.—Some distinguishing characters (counts compared with those of some authors) of *Diplospinus multistriatus* and *Paradiplospinus gracilis*.

Characters / Species	*Diplospinus multistriatus*	*Paradiplospinus gracilis*
Position of anus	midway between tip of snout and tip of caudal fin; in front of first anal spine by distance equal to head length (Fig. 1A)	nearer tip of caudal fin than to tip of snout; in front of first anal spine by distance equal to snout length (Fig. 1B)
Anal fin	anterior part very low, with almost no fin membrane (Fig. 1A)	anterior part fairly high, with fin membrane (Fig. 1B)
Lateral line	easily removed; double ? (Fig. 1A)	usually intact; single (Fig. 1B)
Dorsal-fin rays	XXXI–XXXIV, 35–40 (this study) XXX–XXXIV, 36–42 (Parin and Bekker 1972) XXXI–XXXIII, 37–41 (Karrer 1975) XXXII–XXXVI, 37–41 (Parin *et al.* 1978) XXXII–XXXIII, 40 (Tucker 1956)	XXXVI–XXXIX, 28–33 (this study) XXXVI–XXXIX, 28–33 (Parin and Bekker 1972) XXXVI–XXXVII, 28–30 (Karrer 1975) XXXVI–XXXVII, 28–32 (Bussing 1965) XXXVI–XXXVII, 28–32 (DeWitt and Hureau 1979)
Anal-fin rays	II, 28–33 (this study) II, 29–32 (Parin and Bekker 1972) II, 28–34 (Karrer 1975) II, 28–33 (Parin *et al.* 1978)	II, 26–31 (this study) II, 25–30 (Parin and Bekker 1972) II, 26–28 (Karrer 1975) II, 25–28 (Bussing 1965) II, 25–28 (DeWitt and Hureau 1979)
Vertebrae number	22–24 + 34–37 = 57–61 (this study) 59–61 (Karrer 1975) 34 + 24 = 58 (Tucker 1956)	32–34 + 32–34 = 65–66 (this study) 61 (Karrer 1975) 63–67 (DeWitt and Hureau 1979) 63–66 (Bussing 1965) 38–40 + 26–27 = 65–66 (Andriashev 1960)

more or less damaged and the vertical-fin rays are folded with damaged fin membranes. Some distinguishing characters of the species are summarized in Table 1. Useful characters for distinguishing the species are the number of dorsal spines and the number of dorsal soft rays (the total number of both is not useful) and the position of the anus. The number of anal-fin rays overlaps, so it is not a very useful character. The shapes of the anal fin and the lateral line are often hard to see. The number of vertebrae (total) clearly differentiates the species.

Lateral Line

The lateral line of *D. multistriatus* is easily removed, but careful examination with a microscope can find remains somewhere on the bodies of even fairly damaged specimens. The remains are found most often on the shoulder region and next most often on the mid-portion of the body. The lateral-line system based on several specimens compounded is shown in Fig. 1A. The upper lateral line is recognized certainly. The lower lateral line was discerned only partly in three out of 24 specimens examined, and it is not certain whether the lower lateral line connects with the upper lateral line or where its anterior and posterior terminations may be. From the upper margin of the opercle the upper lateral line of *D. multistriatus* descends gently to below the middle of the body at the anus, thereafter running near the ventral contour of the body to the caudal region. The shape

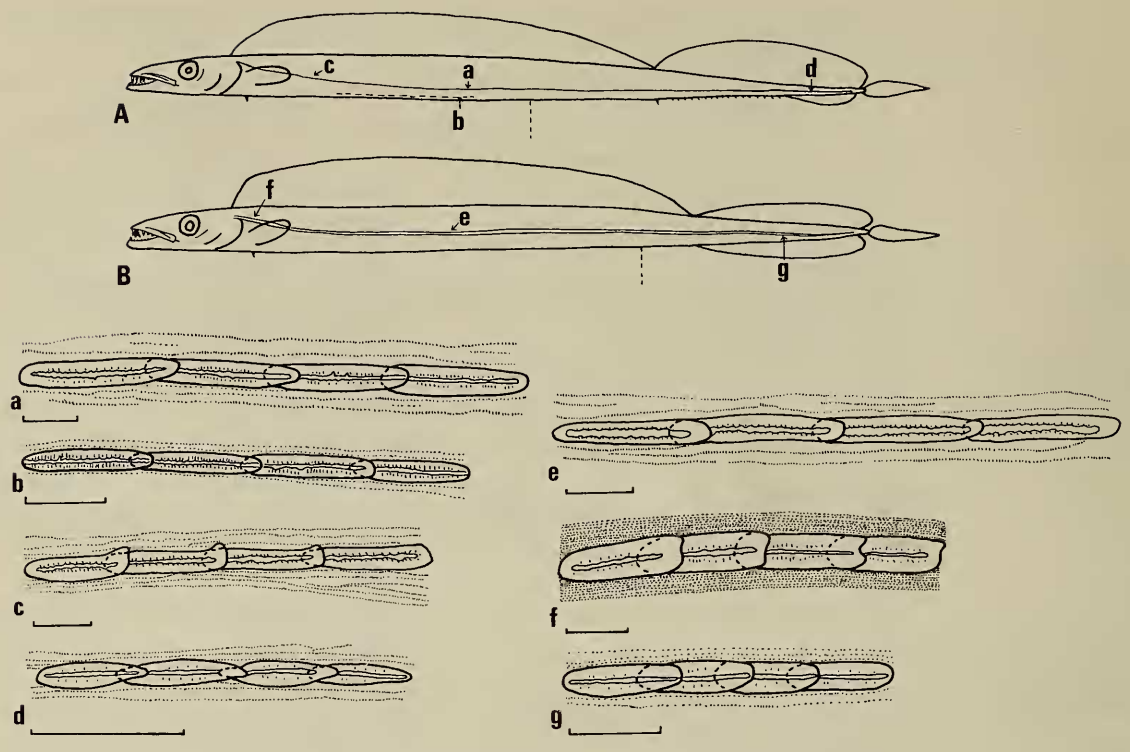

Fig. 1. A, A reconstruction of the lateral-line system of *Diplospinus multistriatus* based on several specimens; B, A reconstruction of the lateral-line system of *Paradiplospinus gracilis* based on several specimens. Vertical broken lines show the position of the anus. a–g shows the details of lateral-line scales, a–d from the positions shown in *D. multistriatus* (A) and e–g from *P. gracilis* (B). a–c: USNM 215454, 232.8 mm SL; d: USNM 215428, 55.2 mm SL; e: USNM 208446, 255.5 mm SL; f: USNM 226992, 355.0 mm SL; g: USNM 208449, 190.5 mm SL. Scales indicate 1 mm.

of the lateral-line scales is slightly different in various parts of the body as shown in Fig. 1a–d. Each scale is basically tube-shaped with an irregular longitudinal external slit.

The lateral line of *P. gracilis* is conspicuous, tough, and not usually lost. Most of the lateral line remains intact in even fairly damaged specimens. The lateral-line system, based on several specimens, is shown in Fig. 1B. The lateral line of *P. gracilis* is single, descending gently from the upper margin of the opercle to slightly below the middle of the body at the anus, thereafter running slightly nearer the ventral contour of the body to the caudal region (Fig. 1B). The shape of the lateral-line scales is somewhat different in various parts of the body, as shown in Fig. 1e–g. Each scale is basically a short tube with an irregular external slit. Scales in the middle of the lateral line (Fig. 1e) are much more elongate than those in the anterior and posterior parts (Fig. 1f, g). Lateral-line scales are generally stouter in *P. gracilis* than in *D. multistriatus*.

The course of the (upper) lateral line is similar in both species. Careful observation, however, reveals that most of the (upper) lateral line is situated only slightly below mid-body in *P. gracilis* and far below mid-body in *D. multistriatus*. Excluding the lower lateral line of *D. multistriatus* from consideration, similar lateral lines running below mid-body are found in some trichiurid genera, such as *Trichiurus, Lepturacanthus, Eupleurogrammus* and *Tentoriceps,* but not in any other gempylid genera, which have the single lateral line or the upper part of a double lateral line running nearer to the dorsal countour than the ventral contour. This may suggest a close relationship of gempylids and trichiurids.

The basic structure of the lateral-line scales of *D. multistriatus* and *P. gracilis* are similar. This type of lateral-line scale (tube-shaped scale with an irregular longitudinal external slit which has relatively small openings at both ends of each scale) is not found in any other genera of Gempylidae and Trichiuridae.

The lateral line seems to become fully formed at about 50 mm SL in both *D. multistriatus* and *P. gracilis*. The size at which the lateral-line development starts could not be ascertained, though some larval materials of both species were examined in this study. Specimens of *D. multistriatus* about 20 mm SL do not show any traces of the lateral line (Strasburg 1964; Yevseyenko and Serebryakov 1973) and a specimen of *P. gracilis* 32.2 mm SL does not show any traces of it (Bussing 1965).

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